Step 2 Verify New Settings

Turn the airflow on to verify the new prescription setting. The card can now be removed or you can leave the card in the BiPAP Pro Bi-Level System to record device usage. Once the prescription settings have been transferred to the BiPAP Pro Bi-Level System, they will be deleted from the SmartCard.

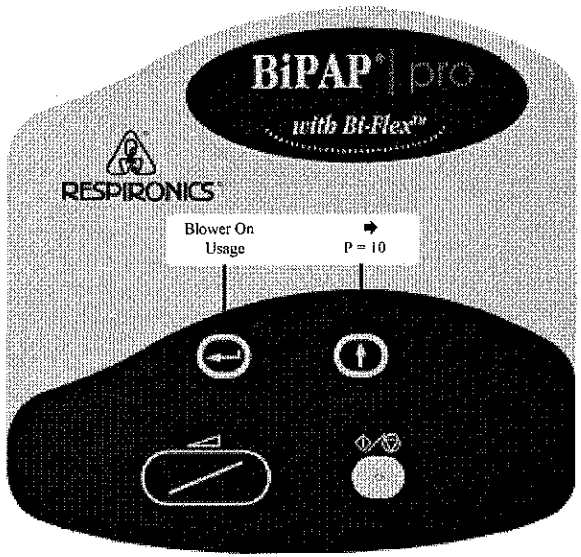

Figure 4-3
Prescription Verified Screen

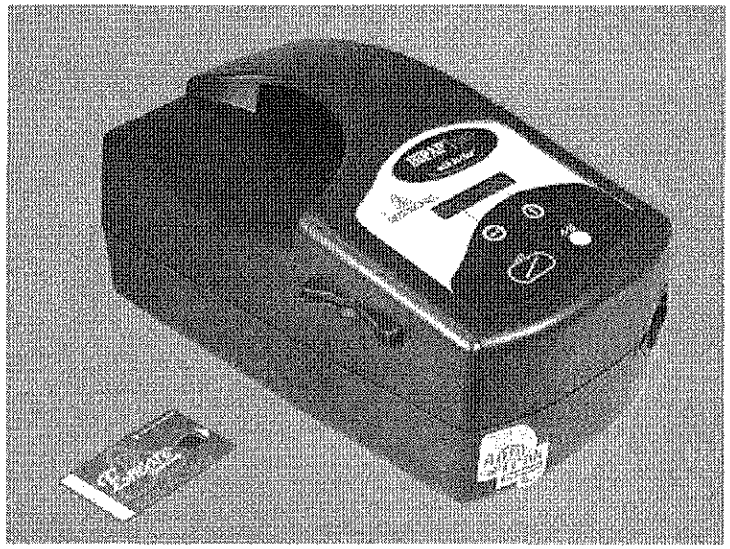

Figure 4-4
SmartCard Removed

4.4 System Setup

Step 1 Plug the male end of the AC power cord into an electric outlet.

Step 2 Simultaneously, see Figure 4-6, press the two User buttons (below the display screen) and plug the female end of the AC power cord in to the AC inlet on the back of the BiPAP Pro Bi-Level System. Hold the two buttons down until the unit beeps twice.

NOTE: If a System Error 7 "key stuck" occurs, repeat the process in Step 2 again.

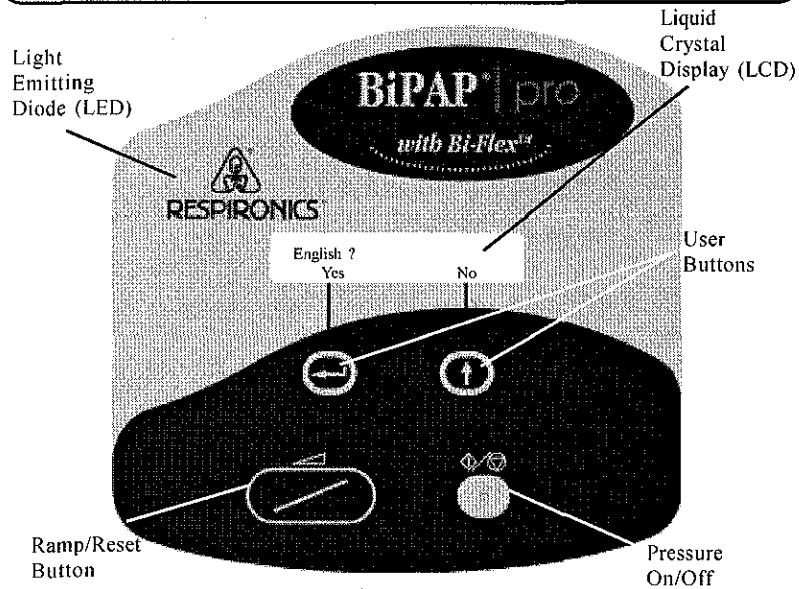

Figure 4-5
Touchpad Features

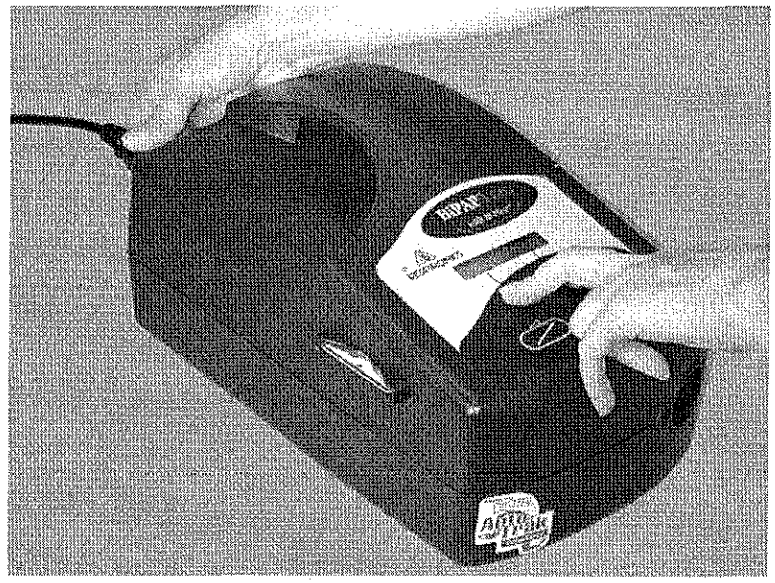

Figure 4-6
Connecting and Entering the Therapy Setup Mode

4.4.1 Display Screens

NOTE: You cannot turn the air flow on when you are in the Therapy Setup menu. When you exit this menu, the Patient Setup menu will be displayed.

NOTE: During system setup, press the left User button to confirm a correct setting, press the right User button to change an incorrect setting. Holding the right User button down will cause the values to change more quickly.

The BiPAP Pro Bilevel System can be used in three different modes: Bi-Level, Bi-Flex, or CPAP. Refer to Page 4-7 for set-up instructions for Bi-Level Mode. See Note on page 4-9 for CPAP instructions, or refer to page 4-15 for Bi-Flex instructions.

Set-up for Bi-Level Mode

Step 1 Set the Display Language

The system can display screen information in 11 different languages. If the language setting is correct, press the left User button. To change the language setting, press the right User button until the correct language is displayed. Press the left User button to confirm the setting.

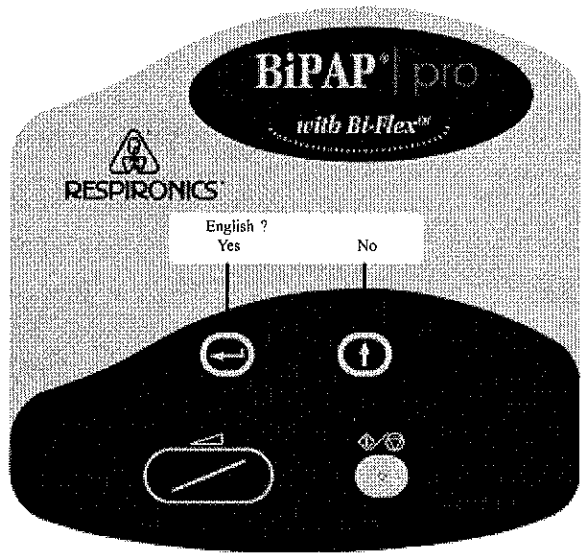

Figure 4-7
Display Language Screen

Step 2 Set the Mode

After setting the language, the current mode setting will be displayed. The BiPAP Pro will operate in the Bi-Level Mode. Press the left User button to confirm the setting.

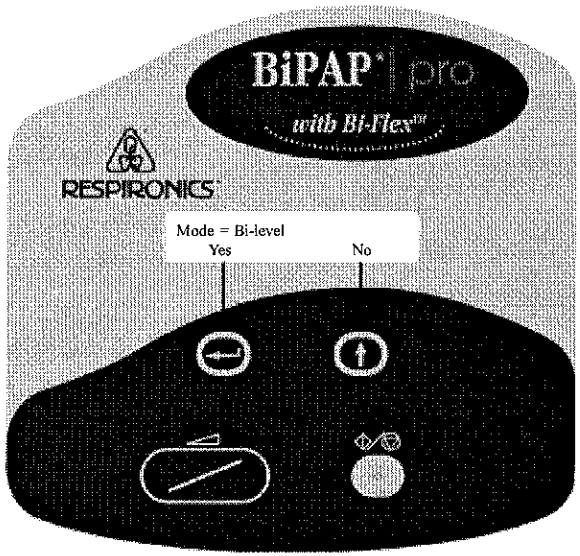

Figure 4-8
Mode Setting Screen

Step 3 Set the Comfort Control Parameter

After setting the mode, the Comfort Control feature will appear. It allows you to set the transition time between EPAP to IPAP. A setting of "Off" will result in normal BiPAP transition from EPAP to IPAP.

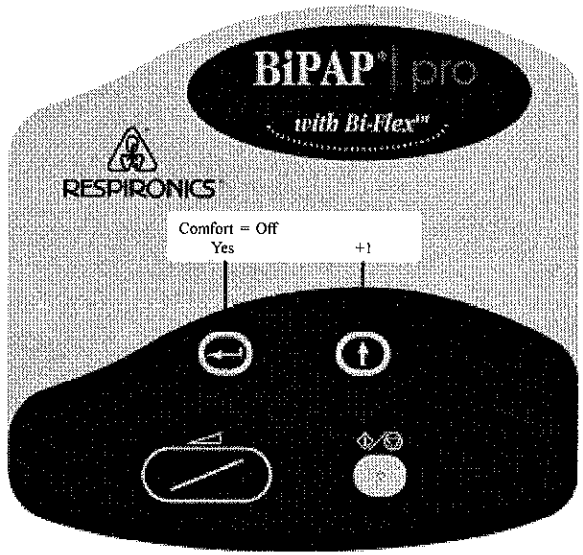

Figure 4-9
Comfort Setting Screen

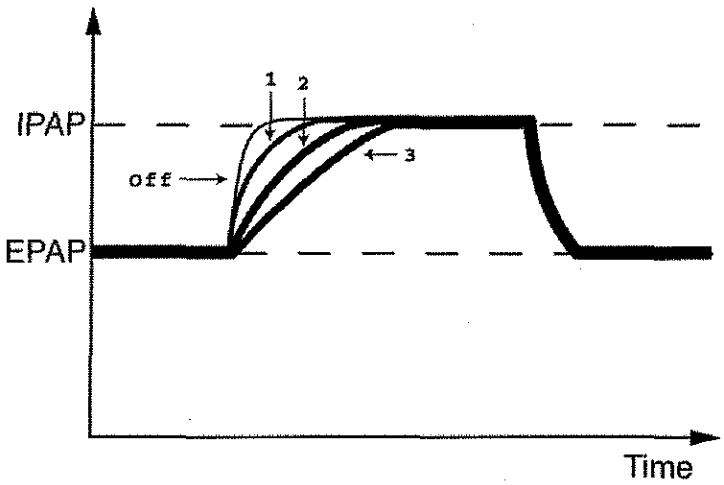

Figure 4-10
Diagram of Comfort Control Parameters

NOTE: The BiPAP Pro can be used as a CPAP device by setting the IPAP and EPAP to the same pressure setting.

Step 4 Set the IPAP Pressure

After confirming the mode, the IPAP pressure will be displayed. If the pressure setting is correct, press the left User button. To change the pressure, press the right User button. The IPAP pressure cannot be set lower than the EPAP pressure setting. If the pressure setting is correct, press the left User button.

Range: 3.0 - 20.0 cm H_2O
1.0 cm H_2O increments

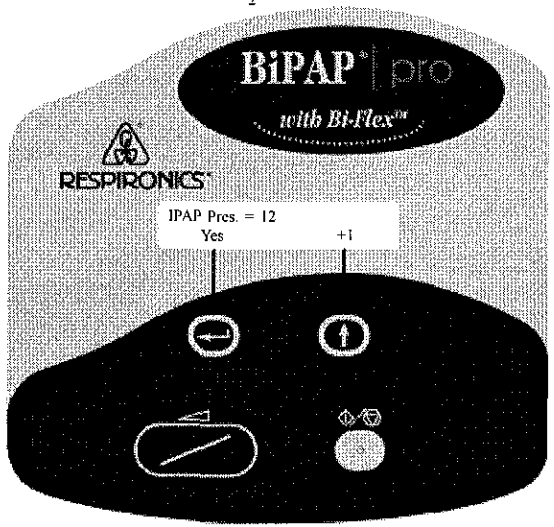

Figure 4-11
IPAP Pressure Screen

Step 5 Set the EPAP Pressure

After setting the IPAP pressure, the EPAP pressure setting will be displayed. To change the pressure, press the right User button. The EPAP pressure setting cannot be higher than the IPAP setting. If the pressure setting is correct, press the left user button.

Range: 3.0 - 20.0 cm H_2O
1.0 - cm H_2O increments

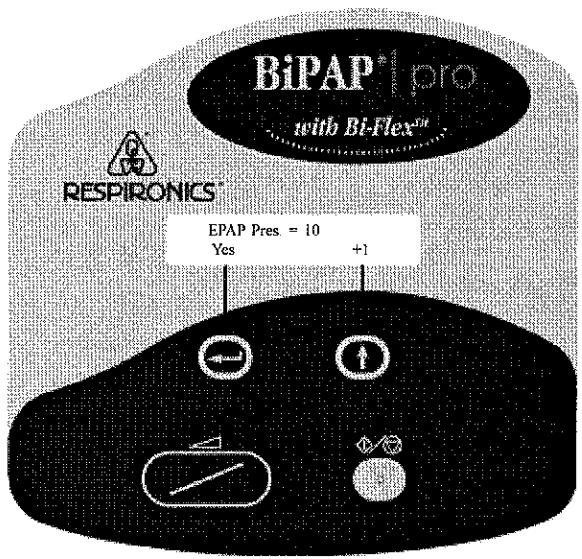

Figure 4-12
EPAP Pressure Screen

Step 6 Selecting the Ramp

Note: The BiPAP Pro is equipped with two different Ramp modes, Bi-Level and Linear.

After setting the EPAP pressure the Ramp screen will appear. The user may choose between Bi-Level, Linear or No Ramp. Press the right User button to select the desired Ramp mode. When the desired mode is selected, press the left User button.

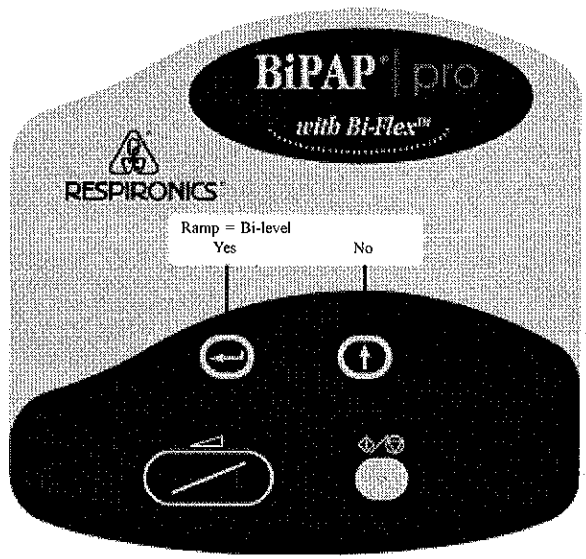

Figure 4-13
Ramp Operation

System Setup (Continued)

NOTE: Bi-Level Ramp is recommended for patients with higher EPAP settings. Bi-Level Ramp maintains the pressure differential between the IPAP and EPAP settings.

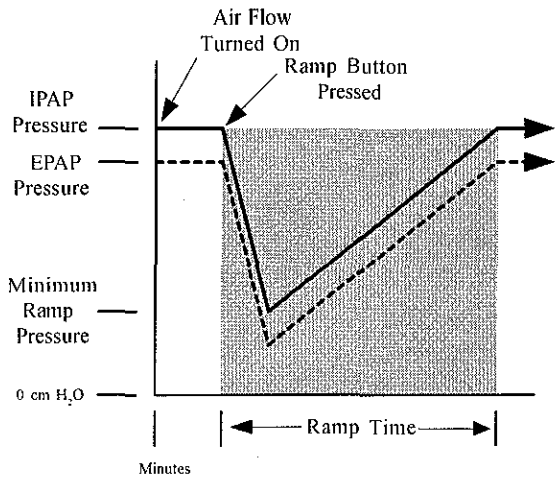

Figure 4-14
Bi-Level Ramp Operation

NOTE: Linear Ramp is recommended for patients with lower EPAP settings or when there is a large differential between the IPAP and EPAP settings.

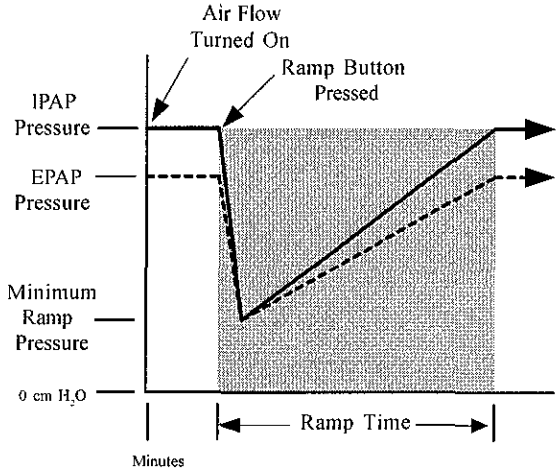

Figure 4-15
Linear Ramp Operation

Step 6 Set the Ramp Time Settings

After selecting the desired Ramp, the Ramp Time screen will be displayed. If the right User button is pressed, the ramp time can be changed. When the Ramp Time is correct, press the left User button.

Range: 5 - 45 minutes

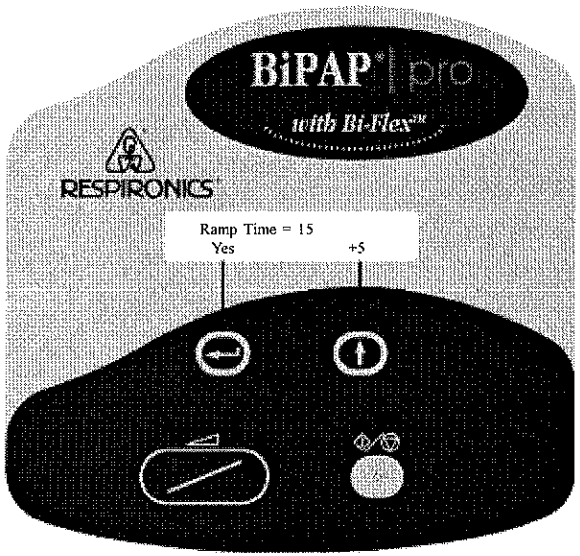

Figure 4-15
Ramp Time Screen

Step 5 Set the Minimum Ramp Pressure

After selecting the Ramp Time, the Ramp Pressure screen will be displayed. If the right button is pressed, the ramp pressure can be changed. When the Ramp Pressure is correct, press the left User button.

Range: 3.0 cm H_2O - EPAP pressure setting
1.0 cm H_2O increments

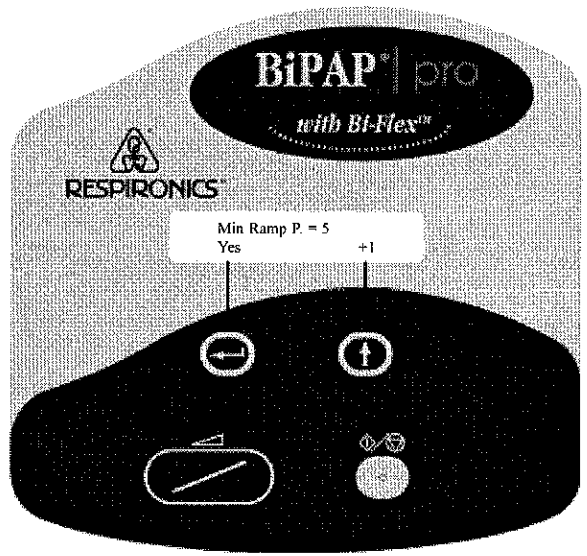

Figure 4-16
Ramp Pressure Screen

System Setup (Continued)

Step 6 Set the Mask Alert

The Mask Alert setting will be displayed. When turned "ON", the mask alert will sound whenever a large, continuous leak (such as mask removal) has been detected in the circuit, and the correct pressure cannot be delivered to the patient. If the correct setting is displayed, press the left User button. To change the mask alert, press the right User button until the correct setting is displayed. Press the left User button to confirm the setting.

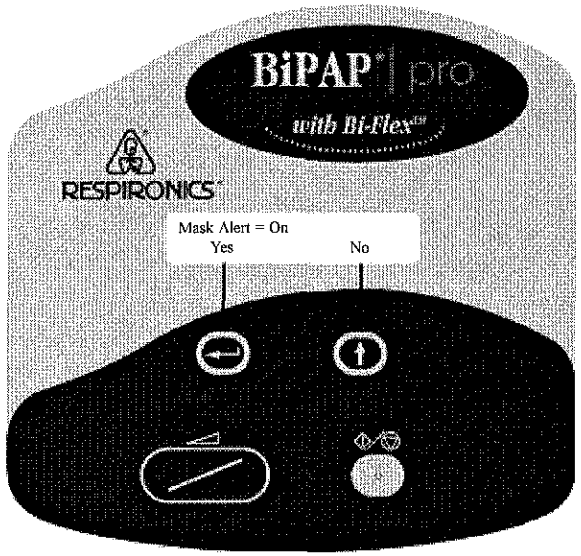

Figure 4-17
Mask Alert Screen

NOTE: The patient also has access to this setting in the Patient Setup menu.

Step 7 Set the Auto-on

The Auto-on setting will be displayed. The Auto-on feature allows the air flow to automatically turn on when the patient begins breathing through the Patient Circuit. Some mask types and circuit configurations may prevent the BiPAP Pro Bi-Level System from automatically turning on. The Pressure On / Off button can always be used to turn the air flow on. To change the setting, press the right User button until the correct setting is displayed. Press the left User button to confirm the setting.

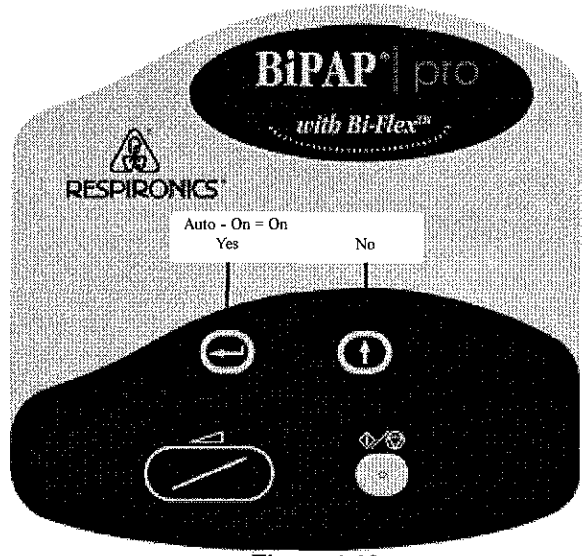

Figure 4-18
Auto-on Screen

Step 8 Set the Auto-off

The Auto-off setting will be displayed. The Auto-off feature allows the air flow to automatically turn off when the BiPAP Pro Bi-Level System does not detect breathing through the connected circuit. This is usually because the mask has been removed or the tubing has become disconnected. Some mask types and circuit configurations may prevent the BiPAP Pro Bi-Level System from automatically turning off. The Pressure On / Off button can always be used to turn the air flow off. To change the setting, press the right User button until the correct setting is displayed. Press the left User button to confirm the setting.

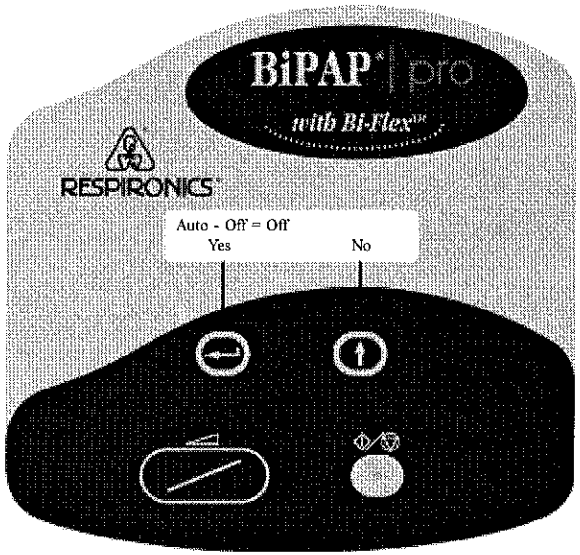

Figure 4-19
Auto-off Screen

Step 9 Therapy Hours

The Therapy hours will be displayed. This screen displays the total number of hours the patient has used the BiPAP Pro Bi-Level System at pressure. The therapy hours can be reset to give a detailed look at patient usage. This data may be useful in tracking patient compliance. Resetting the therapy hours will not erase the total operation time or other patient data. To continue adding therapy hours to the current total, press the left User button. To erase the therapy hours, press the right User button. The total therapy hours will now read "ERASE". Press the left User button to confirm the setting.

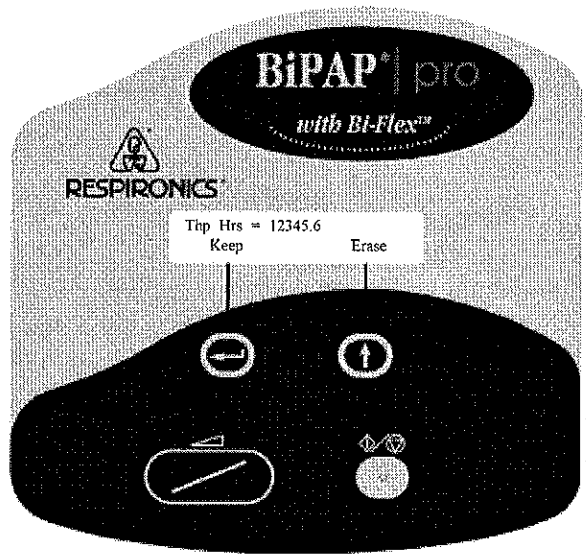

Figure 4-20
Therapy Hours Screen

Step 10 Save and Exit Settings

You have now completed all of the settings. To save the setting and exit the Therapy Setup menu, press the left User button. To make further changes to the settings, press the right User button. You will now be returned to the beginning of the Therapy Setup menu.

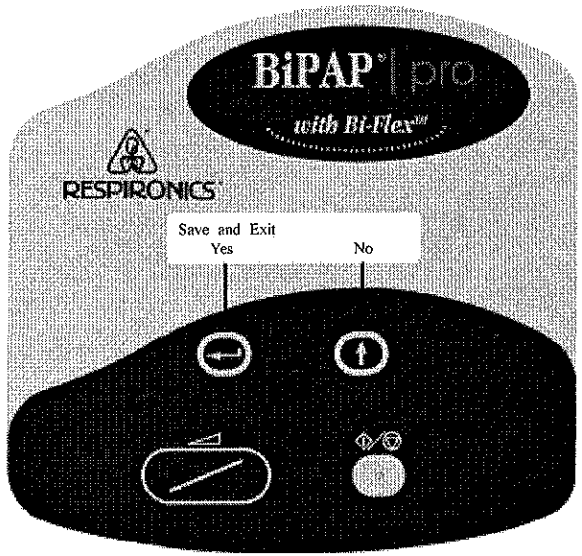

Figure 4-21
Save and Exit Screen

Set-up for Bi-Flex Mode

Step 1 Set the Display Language

The system can display screen information in 11 different languages. If the language setting is correct, press the left User button. To change the language setting, press the right User button until the correct language is displayed. Press the left User button to confirm the setting.

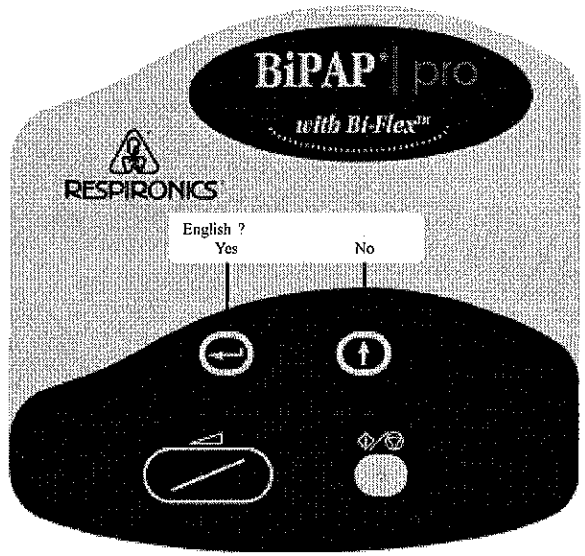

Figure 4-22
Display Language Screen

Step 2 Set the Mode

After setting the language, the current mode setting will be displayed. Press the right user button to get to the Bi-Flex Mode screen.

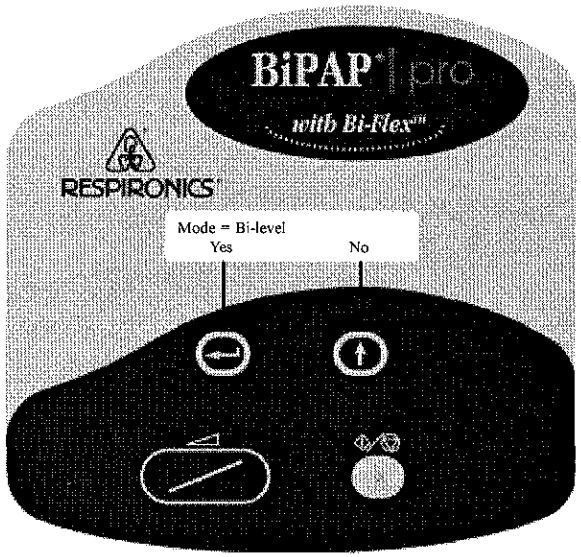

Figure 4-23
Mode Setting Screen

After no has been chosen for the Bi-Level Mode, this screen will be displayed. Press the left user button to choose Bi-Flex Mode.

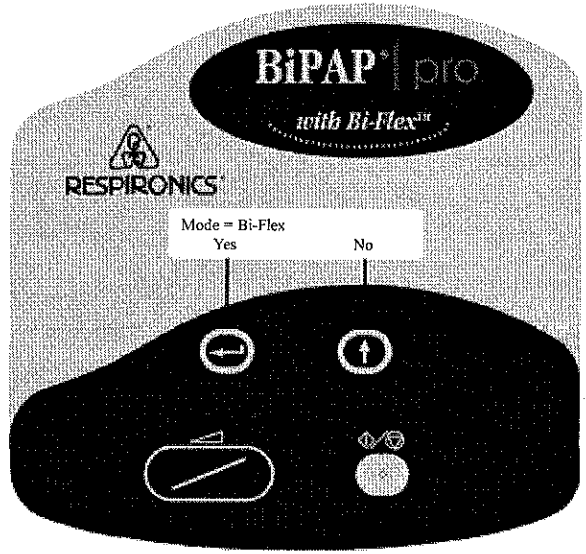

Figure 4-24
Mode Setting Screen

Step 3 Set the Bi-Flex level Mode

The next screen will allow you to adjust the bi-level therapy by inserting a small amount of pressure relief during the latter stages of inspiration and during active exhalation. After this step; follow steps 4 through 10 starting on page 4-9 to finish set-up.

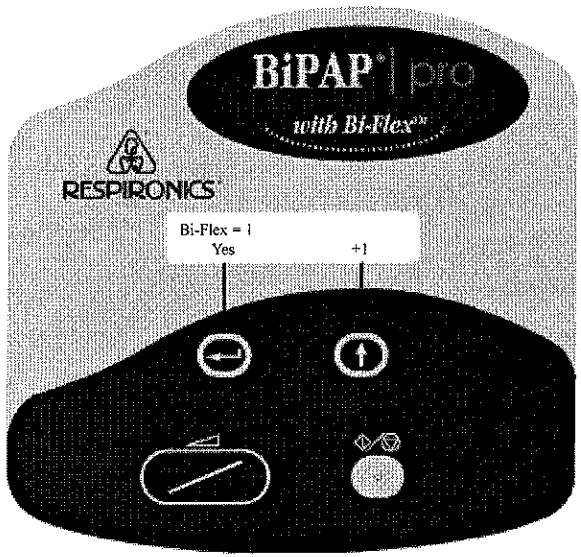

Figure 4-25
Bi-Flex Setting Screen

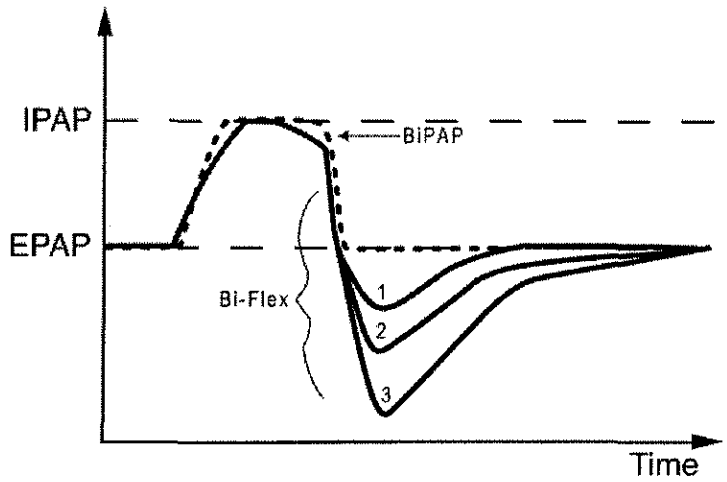

Figure 4-26
Diagram of Bi-Flex Levels

4.5 Recommended, Alternate, and Optional Circuit Accessories

This section addresses the recommended, alternate, and optional circuit accessories that can be used with the BiPAP Pro Bi-Level System. For additional information, refer to the User's Manual or the Home Care Providers Manual or the literature supplied with accessory.

4.5.1 Recommended Accessories

To use the BiPAP Pro Bi-Level System, the following accessories are recommended in order to assemble the circuit.

WARNING: The BiPAP Pro Bi-Level System should only be used with the recommended patient circuit identified below.

Recommended Patient Circuit

- Nasal Mask & Whisper Swivel II
  Exhalation Port (or Respironics mask w / integrated exhalation port such as the Monarch® Mini Mask)
- 6 ft. (1.83 m) Flexible Tubing Assembly
  (reusable or lightweight)
- Headgear or Softcap (not shown)

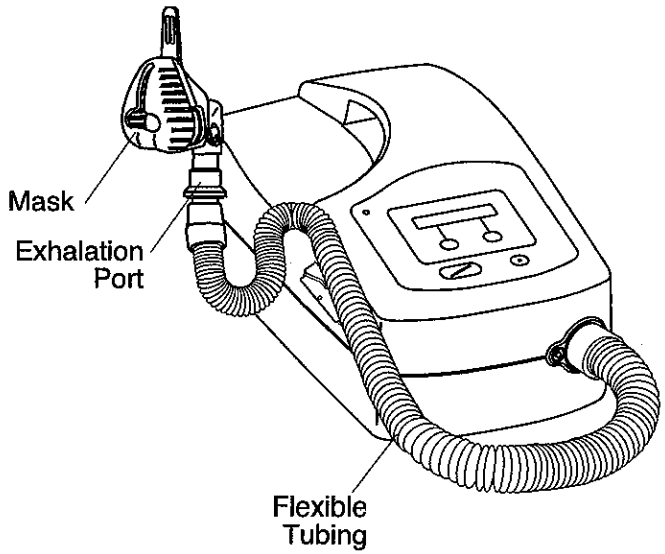

Figure 4-27
BiPAP Pro Bi-Level System with Recommended Circuit

Recommended, Alternate, and Optional Circuit Accessories (Continued)

4.5.2 Alternate and Optional Circuit Accessories

The Respironics alternate accessories listed in Table 4-1 can be used in place of the recommended accessories. The optional accessories can be added to the patient circuit. Refer to Table 4-1 for changes in the pressure / flow characteristics when using these accessories.

Table 4-1, Patient Circuit Accessory Pressure / Flow Characteristics

	Pressure Drop @ 30 lpm (cm H_2O)	Pressure Drop @ 60 lpm (cm H_2O)
Recommended Patient Circuit		
Nasal Mask (disposable, reusable)	0.03	0.09
GoldSeal Nasal Mask (reusable)	0.03	0.09
Monarch Mini Mask	0.20	0.77
Whisper Swivel II (reusable)	0.02	0.08
6 ft. (1.83m) Reusable Flexible Tubing	0.11	0.30
Alternate Accessories		
Spectrum Disposable Full Face Mask	0.04	0.10
Plateau Exhalation Valve (reusable)	0.05	0.20
6 ft. (1.83m) Disposable Circuit & Exhalation Port	0.20	0.34
Optional Accessories		
Respironics LX Humidifier	0.14	0.40
24 in. Reusable Tubing (used with humidifier)	0.03	0.10
18 in. Disposable Tubing (used with humidifier)	0.00	0.00
18 in. Reusable Tubing (used with humidifier)	0.00	0.10
King Bacteria Filter (disposable)	0.74	1.65
Comfort Flap Mask Accessory (reusable)	0.00	0.00

Recommended, Alternate, and Optional Circuit Accessories (Continued)

The following graph provides the exhaust / flow characteristics of the exhalation port accessories that can be used with the BiPAP Pro Bi-Level System. This information may help assess the CO_2 rebreathing potential of various circuit configurations at different applied pressures.

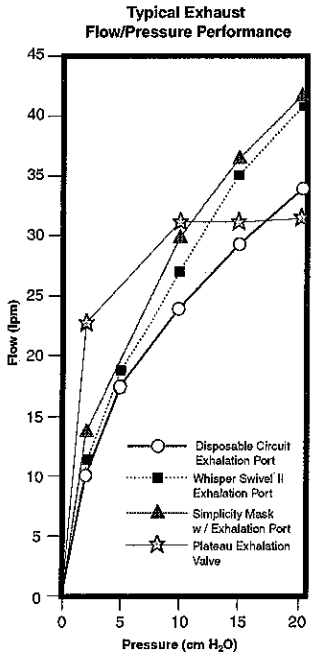

Figure 4-28
Typical Exhaust Flow / Pressure Performance

WARNING: Appropriate diagnostic pressures must be determined when alternate or optional accessories are in place. Respironics reusable circuit accessories are washable, but are for single patient use only. They are not intended to be used on multiple patients.

4.5.3 DC Power Accessories

The Respironics Shielded Power Cord (RI P/N 1001956) can be used to operate the BiPAP Pro Bi-Level System in a stationary recreational vehicle, boat, or motor home.

The Respironics DC Battery Adapter Cable (RI P/N 532209) when used with the Respironics Shielded DC Power Cord enables the BiPAP Pro Bi-Level System to be operated from a 12 VDC freestanding battery.

NOTE: Respironics recommends a 100 amp-hour deep cycle marine battery.

The BiPAP Pro Bi-Level System should not be operated while the vehicle is in motion.

CAUTION: Only use the Respironics DC Power Accessories. Use of any other system may cause damage to the BiPAP Pro Bi-Level System or the vehicle.

CAUTION: DC Power is not intended to be used as battery backup. DO NOT connect the DC Power while the BiPAP Pro Bi-Level System is operating on AC Power. System damage may occur.

Recommended, Alternate, and Optional Circuit Accessories (Continued)

4.5.4 Adding a Humidifier

When using a humidifier, always disconnect the humidifier tubing from the BiPAP Pro Bi-Level System when it is turned off. DO NOT use a room humidifier within 6 ft. (1.83m) of the BiPAP Pro Bi-Level System. Moisture can build up in the system and cause damage. Follow instructions included with the humidifier.

The mask alert, auto-on, and auto-off functions are convenient features that may not work at extreme altitude levels, or with some mask types or circuit configurations (e.g.: pass-over humidifier; full-face mask). If this occurs, the Pressure On / Off button on the BiPAP Pro Bi-Level System should be used to turn the airflow on or off. This will not adversely affect the therapy received from the system.

4.5.5 Adding Oxygen to the System

Please note the warnings listed below when using oxygen with the BiPAP Pro Bi-Level System.

WARNING: When using oxygen with the BiPAP Pro Bi-Level System, *turn the unit on before turning the oxygen on.* Turn the oxygen off before turning the BiPAP Pro Bi-Level System off. This will prevent oxygen accumulation in the room.

WARNING: Oxygen supports combustion. Do not use oxygen in the presence of open flames, cigarette smoke, electrical spark, or other sources of ignition.

4.6 Operating Time and Available Memory

To display the total operating time and the available memory, press the left User button. The usage hours will be displayed for 10 seconds and then return to the main screen.

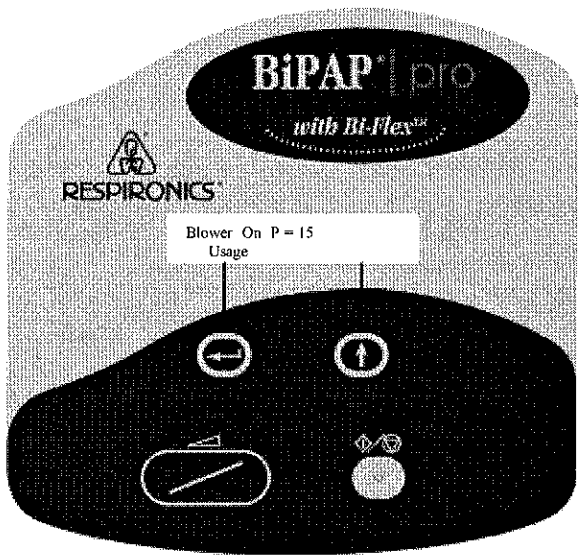

Figure 4-29
Blower Screen

4.6.1 Operating Time and Available Memory Display

M = The percentage of memory space available. The BiPAP Pro Bi-Level System records patient usage information (e.g.: a history of pressure settings, time the system was used for therapy). Some physicians and home care providers record this information to assist in the patients CPAP treatment. When 000% is displayed, the memory is full and the current data will start to overwrite the oldest data.

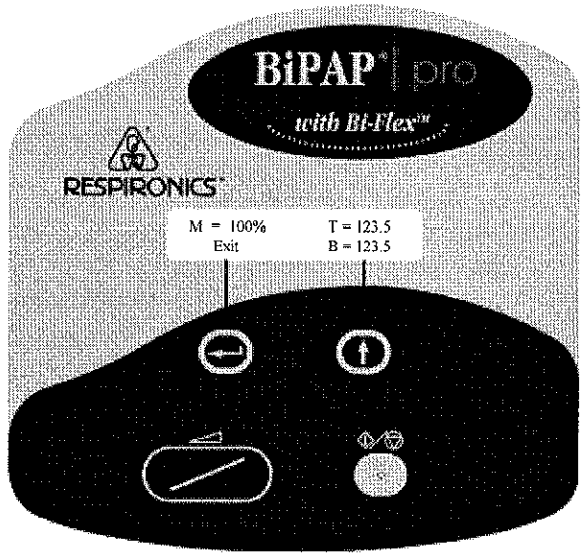

Figure 4-30
Memory, Therapy Hours, and Blower Time Screen

Operating Time and Available Memory (Continued)

M = The percentage of memory space available. When the SmartCard is not inserted in the BiPAP Pro Bi-Level System, the memory display will read M = - - -%.

T= The therapy hours are the total number of hours the BiPAP Pro Bi-Level System has operated at therapeutic pressure. The therapy hours can be reset to give a detailed look at patient usage.

B = The total blower time is the total number of hours the BiPAP Pro Bi-Level System has been in use. This includes factory testing time.

Exit = Returns the display to the main screen.

4.7 Pressure Adjustment Menu

The user has the option of adjusting the pressure while the blower is running. To enter the Pressure Adjustment mode, press the two top User buttons simultaneously.

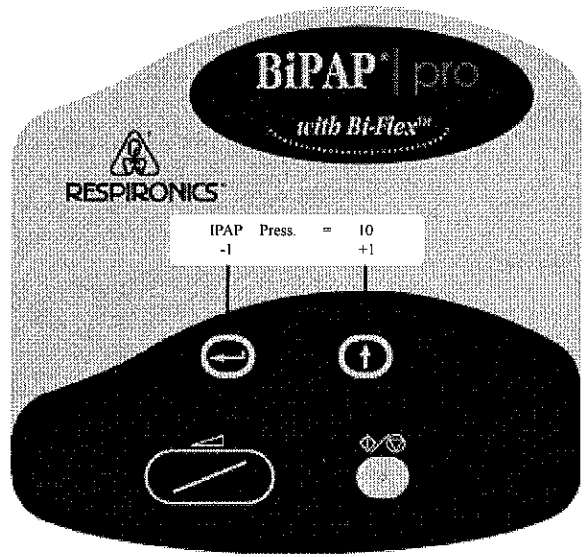

Figure 4-31
IPAP Pressure Adjustment Screen

Pressure Setup Screens (Continued)

If after two seconds no button is pressed, the bottom line of the menu screen will toggle to indicate the next Pressure Adjustment screen for two seconds and then go back to the previous screen.

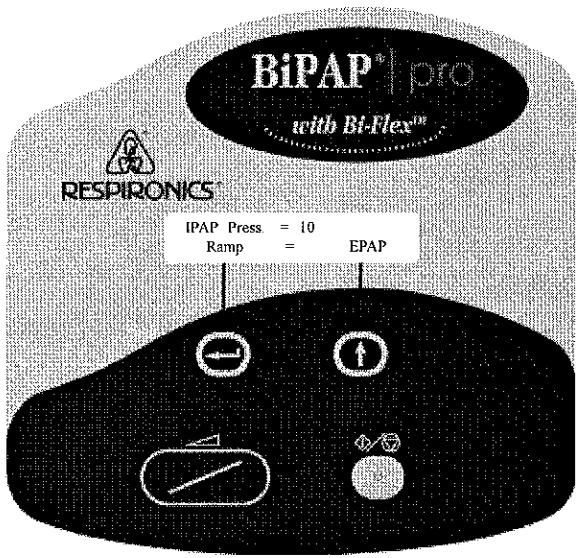

Figure 4-32
IPAP Exit Screen

When the Ramp button is pressed, the EPAP Pressure Adjustment screen will appear.

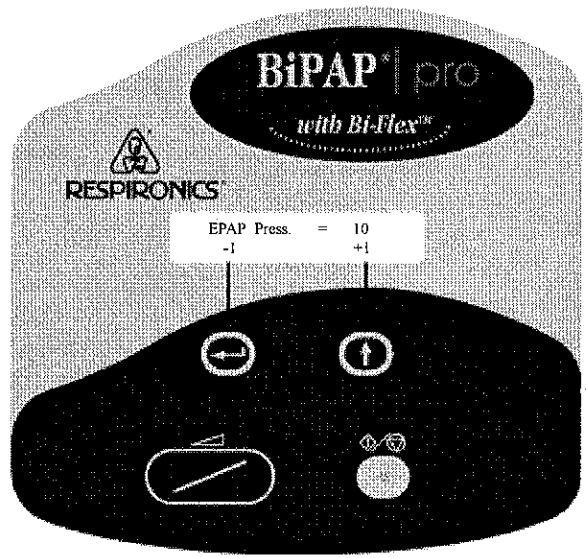

Figure 4-33
EPAP Pressure Adjustment Screen

Pressure Adjustment Menu (continued)

If after two seconds no button is pressed, the bottom line of the menu screen will toggle to the next Pressure Adjustment screen for two seconds and then back to the previous screen.

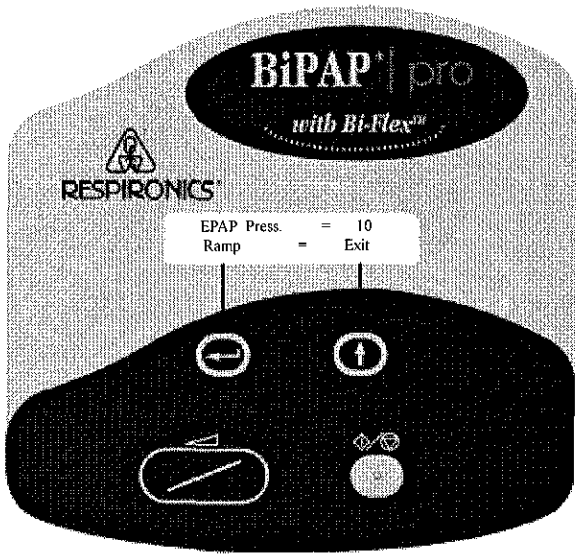

Figure 4-34
EPAP Exit Screen

If the Ramp button is pressed, the user will be sent back to the regular menu screen.

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Chapter 5: Routine Maintenance

5.1 Overview 5-3

5.2 Cleaning the System 5-3

5.3 Cleaning / Replacing the Intake Filters 5-3

5.4 BiPAP Pro Bi-Level System Preventive Maintenance Schedule 5-5

Notes

Chapter 5: Routine Maintenance

5.1 Overview

This chapter provides guidelines and illustrates the cleaning and maintenance procedures for the BiPAP Pro Bi-Level System.

Before cleaning or performing any routine maintenance, always switch the BiPAP Pro Bi-Level unit's Pressure On / Off button to the Off position and unplug the power cord from the rear of the unit.

5.2 Cleaning the System

WARNING: To avoid electrical shock, disconnect the electrical supply before attempting to clean the BiPAP Pro Bi-Level System. DO NOT immerse the unit in water or allow any liquid to enter the cabinet or the filter intake.

Step 1 Wipe the outside of the unit with a cloth slightly dampened with water and a mild detergent. Let the unit dry before reconnecting the electrical supply.

5.3 Cleaning / Replacing the Intake Filters

The gray pollen filter is a reusable filter that screens out pollens and some household dust. This filter should be cleaned at least once every two weeks under normal usage, or as required, and replaced with a new one every six months. One additional pollen filter is included with the system. The pollen filter must be in place at all times when the unit is operating.

The disposable white ultra-fine filter increases filtration of pollens, dust, some tobacco smoke, and small particles. The ultra-fine filter is included with the system and should be used in addition to the pollen filter. The ultra-fine filter should never be used without the pollen filter. Replace the ultra-fine filter after 30 nights of use or sooner if it appears dirty. DO NOT clean the ultra-fine filter.

CAUTION: Failure to replace a dirty filter may cause the device to operate at higher than normal temperatures and damage the device.

5.3.1 Removing, Cleaning, and Replacing the Filters

Step 1 With the air flow turned off, disconnect the AC or DC power cord from the back of the unit.

Cleaning / Replacing the Intake Filters (Continued)

Step 2 Remove the filter cap by gently lifting up on the bottom of the filter cap, then pulling it away from the back of the unit.

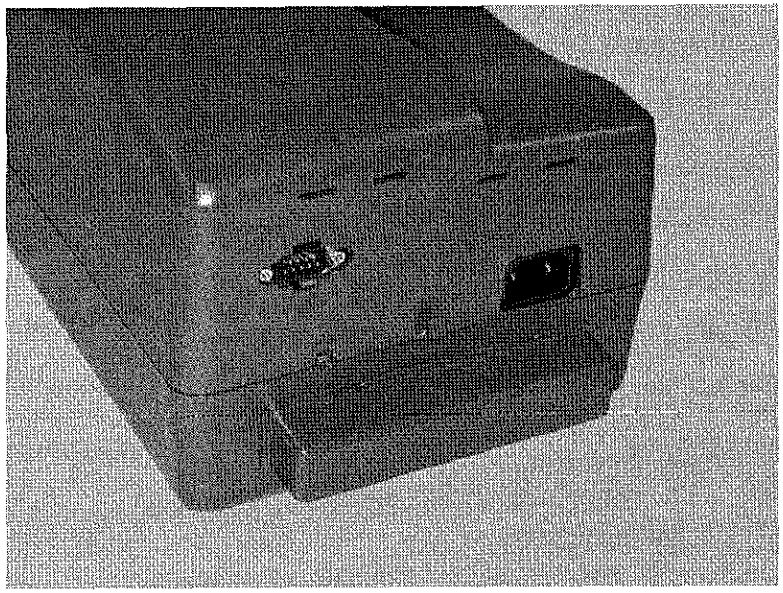


Figure 5-1
Removing the Filter Cap

Step 3 Remove the pollen filter by gently pulling the edges of the filter. Rinse the filter in a steady stream of running water. Squeeze out the water, and repeat. Allow the pollen filter to air dry for 8 to 12 hours, or in a clothes dryer for 15 to 20 minutes.

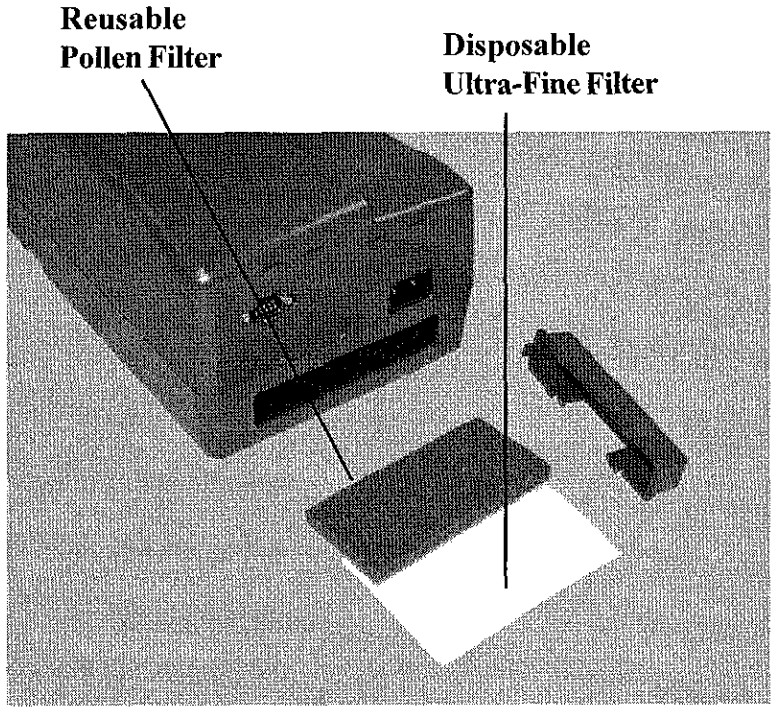


Figure 5-2
The Filter Cap and Filters

Cleaning / Replacing the Intake Filters (Continued)

Step 4 When using the white ultra-fine filter, remove the ultra-fine filter if it appears dirty then discard. Replace with a new filter. Make sure the filter is lying flat.

Step 5 Place the pollen filter over the ultra-fine filter. Install the filters into the filter area in the back of the BiPAP Pro Bi-Level System.

CAUTION: The pollen filter must be completely dry before use. Never place a wet filter into the device. Respironics recommends that you clean the filter in the morning and alternate using the two pollen filters provided with the system to ensure enough drying time for the cleaned filter.

CAUTION: DO NOT place both pollen filters with the ultra-fine filter into the unit at the same time.

Step 6 Install the filter cap. The opening in the filter cap for the BiPAP Pro Bi-Level System should be installed facing down, away from the patient.

5.4 BiPAP Pro Bi-Level System Preventive Maintenance Schedule

The following Preventive Maintenance Schedule lists the items that must be inspected or tested periodically, or after service is performed. Use the Preventive Maintenance Schedule to record the dates on which the maintenance items are performed.

The Preventive Maintenance Schedule may be copied for each unit serviced.

BiPAP Pro Bi-Level System Preventive Maintenance Schedule (Continued)

5.4.1 BiPAP Pro Bi-Level System Preventive Maintenance Schedule (Factory Recommended)

Model No. _____ Serial No. _____ Date _____ Service Technician _____

Maintenance Item	Verification Reference	Service Interval	Date
Record Blower Hours	Displayed On Options Screen	As Desired	
Clean / Replace Pollen Filter	Section 5.3.1	Clean every 2 weeks, or as required; Change every 6 months	
Replace Ultra-Fine Filter	Section 5.3.1	Replace after 30 nights of use (sooner if it appears dirty)	
Perform Testing Process	Section 8.1	After service is performed	
Cleaning	Section 5.2	As required	

Chapter 6: Trouble-Shooting and Diagnostics

6.1 Overview 6-3

6.2 Common System Level Problems 6-4

6.3 Troubleshooting Flow Chart 6-6

6.4 Troubleshooting Table 6-7

6.5 Error Code Chart 6-13

6.6 SmartCard Error Code Chart 6-16

Notes

Chapter 6: Troubleshooting and Diagnostics

6.1 Overview

WARNING: Electrical Shock Hazard: Disconnect the electrical supply before repairing the unit.

CAUTION: Electronic components used in this unit are subject to damage by static electricity. Use proper static discharge equipment and grounding precautions when servicing the equipment. Service only at a static-free workstation.

CAUTION: Due to required calibration after parts replacement, the following may not be replaced on the BiPAP Pro Bi-Level System unless the unit is System Final Tested at a Respironics Service Center equipped with a Multi Functional Test Station.

- Main Printed Circuit Assembly
- Pressure Tubing
- Mass Flow Sensor Tubing
- Blower Assembly
- Valve Assembly
- Flow Element
- Flow Averaging Rings
- Enclosure Insert

This section contains information necessary to troubleshoot and diagnose problems with the BiPAP Pro Bi-Level System. It provides a summary of common system problems as well as a flowchart and table to simplify the troubleshooting process. The error code chart lists all error codes, the associated problem, and suggested corrective action to be taken.

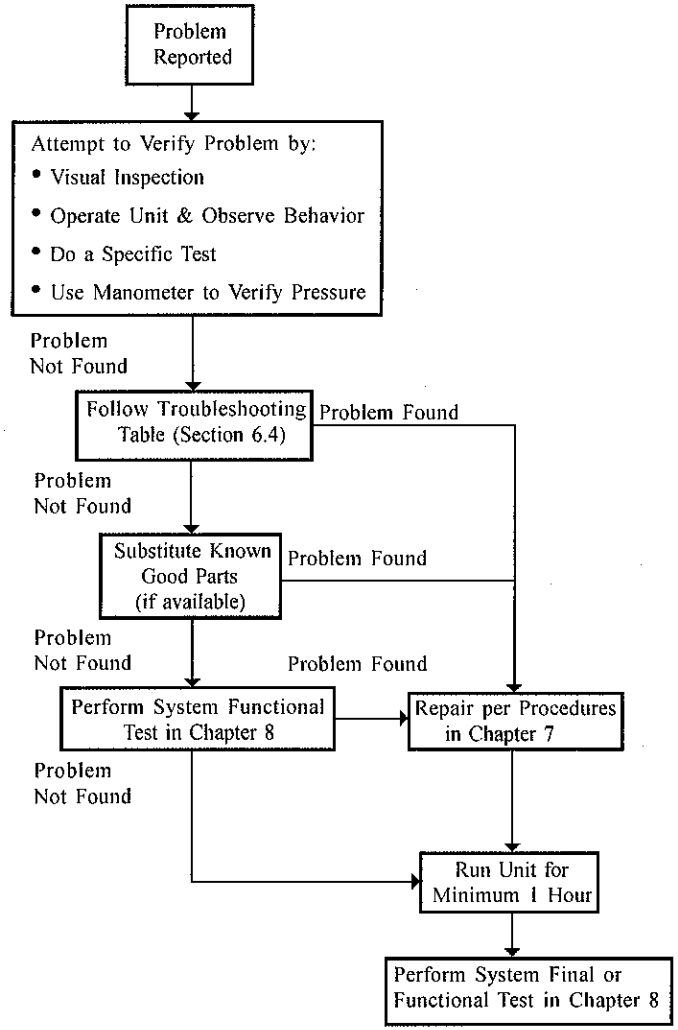
6.2 Common System Level Problems

Screen Message	Description	Result	Corrective Action
Mask Alert	A large circuit leak, such as mask removal, has been detected.	• The air flow will turn off in less than 1 minute (if the auto-off feature has been turned on). • The audible alarm will sound in less then 45 seconds (if the mask alert feature has been turned on).	• Press any button on the BiPAP Pro Bi-Level System to silence the audible alarm and clear the display screen. • Check the circuit (flexible tubing assembly, pressure tubing, mask) for any leaks and adjust the mask and headgear. • Press the Pressure On / Off button to restart the air flow. **Note:** The audible Mask alarm setting can be turned on or off. (See Section 4.4 - System Setup for instructions).

Common System Level Problems (Continued)

Screen Message	Description	Result	Corrective Action
System Error # #	The BiPAP Pro Bi-Level System is not functioning correctly and may need servicing.	• The air flow will turn off immediately. • The alert tone will sound. • The signal light will flash on and off.	• Reset the unit by unplugging the power cord from the electrical outlet and then plugging it in again. • If the message appears again, refer to the Error Code Chart (Section 6.5) for a description of the error and corrective action. **Note:** This alert setting cannot be turned off.

6.3 Troubleshooting Flow Chart


Problem Reported
Attempt to Verify Problem by:
• Visual Inspection
• Operate Unit & Observe Behavior
• Do a Specific Test
• Use Manometer to Verify Pressure
Problem Not Found
Follow Troubleshooting Table (Section 6.4)
Problem Found
Problem Not Found
Substitute Known Good Parts (if available)
Problem Found
Problem Not Found
Problem Found
Perform System Functional Test in Chapter 8
Repair per Procedures in Chapter 7
Problem Not Found
Run Unit for Minimum 1 Hour
Perform System Final or Functional Test in Chapter 8

6.4 Troubleshooting Table

Symptom	Cause	Verification	Corrective Action
Audible Alarm - During audible alarm condition, the alarm is not audible.	• Main printed circuit assembly.	Perform power up sequence. Visually verify the LED's and display illuminate. Reestablish original alert conditions. Listen for audible alarm.	If audible alarm does not work, replace Main PCA (see Note[1]). If visual indicators are not present at power up sequence, perform user interface checkout procedure (see Section 8.2). If device fails user interface checkout procedure, replace control pad. If alarm is audible during both tests, no corrective action is required.
Display Indicator- LED or other indicator not working.	• Control Pad. • Interface cable loose.	Perform user interface checkout procedure (see section 8.2).	If device fails user interface checkout procedure, replace control pad. Check for secure connection of ribbon cable connector.

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
Display- Display is blank or contains erroneous information.	• Display assembly. • Main PCA.	Inspect the cable between the display and the main control board for loose ends. (Cable not backwards).	Replace in order until solved. • Display PCA. • Main PCA (see Note[1]). • Power Supply PCA (see Note[1]).
Intermittent Power Supply Problem- An intermittent on / off condition exists, unit alarms randomly, or indicator lights blink sporadically.	• Power cord, AC inlet, Main PCA, loose connections. • Power Supply PCA.	Inspect power cord for fraying at cable ends. Inspect all connections on the PCA's.	If power supply DC voltage is not within specifications, replace Power Supply PCA (see Note[1]). If power cord or connectors are faulty, replace items as required.

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
Unit does not operate from the 12 VDC power source- Unit blows fuses in the DC cord during DC operation.	Faulty DC plug, low DC voltage, fuse in DC cord is blown. Main PCA.	Ensure the DC voltage supply is a minimum of 12 VDC. Ensure the DC voltage is stable. Monitor the voltage at the back of the DC connector mounted on the Main PCA. If DC voltage is below 11.5 VDC, replace or recharge DC source. If there is no DC measured at the Main PCA, then check the DC adapter cord for continuity.	• If DC cord or source is not at 12 VDC, replace or recharge as required. • If 12 VDC supply is OK, replace Main PCA (see Note[1]).
Noise -	Missing or damaged bottom strip on bottom of unit, blower malfunctioning.	Turn over and inspect the bottom for missing or damaged bottom strip.	• If bottom strip is missing, replace bottom strip. Tighten any loose screws. • Replace Blower (see Note[1]).

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
Odor -	Tubing smells new, unit smells new, airborne residue buildup.	Visually inspect patient tubing for contamination.	Run unit in a clean environment for a few hours to eliminate new smell. Wash tubing with soap and water. To clear residue build-up, replace all subassemblies in the patient air stream (blower, filters, patient circuit).
Outlet air temperature - the outlet air temperature is too warm.	Filters dirty, blower, Main PCA.	Ensure the filter is clean and not restricting air flow. Monitor the outlet temperature at the end of the six foot tubing. A rise in temperature can be expected. Ensure the unit is not next to any heat source.	Replace: in order until solved • Filters • Blower (see Note[1]) • Main PCA (see Note[1])

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
Pressure Related Problems - The outlet pressure does not change or properly adjust.	Pressure tubing has been blocked, disconnected, or kinked. Main PCA or blower malfunction.	Inspect pressure tubing for secure connections and kinks. Check blower for air leaks.	• Secure pressure tubing connections. • Replace blower, pressure tubing, or Main PCA . (see Note[1]).
Pressure Offset - Static pressure fluctuates from -1.0cm to +2.0 cm H_2O.	The delivered pressure is higher or lower than the set value by more than + 2.0 / - 1.0 cm H_2O.	Perform power up process.	• Check tubing for kinks. • Replace the Main PCA (see Note[1]).
No Stored Therapy Data	Smart Card was not installed in unit prior to use.	No therapy data after usage.	Depress the pressure on / off button before disconnecting the Main AC Power.

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

Troubleshooting Table (Continued)

Symptom	Cause	Verification	Corrective Action
Ramp Pressure - The pressure does not ramp correctly.	• No ramp time prescribed. • Ramp minimum pressure has to be lower than CPAP pressure. • Main PCA. • Ramp Button not functioning.	Make sure the patients prescription specified ramp. Make sure unit was set for ramp. Perform user interface checkout procedure (see Section 8.1).	Set unit for ramp. Replace Main PCA (see Note[1]). If device fails user interface checkout procedure, replace control pad or display PCA.
Pressure Variation - The pressure varies around the set value, pressure fluctuates greater than 1.25 cm H_2O.	• Internal air leak. • Filters dirty. • Main PCA, blower. • Air path blocked.	Replace filters. Perform Testing Precess (see Section 8.1).	Replace blower (see Note[1]). If pressure still drifts, then replace Main PCA (see Note[1]).

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

6.5 Error Code Chart

Error Code	Problem	Corrective Action
0	PROM Test - The code in the PROM is corrupt.	Replace Main PCA (see Note[1]).
1	RAM Test - The RAM on the Main PCA is not functioning properly.	Replace Main PCA (see Note[1]).
2	Stack Test - The Stack memory on the Main PCA is not functioning properly.	Replace Main PCA (see Note[1]).
3	Invalid Parameter - A failure has been detected in the nonvolatile memory on the Main PCA.	Reset the parameter by simultaneously pressing the two user buttons while reconnecting the power cord. Reconfigure unit and test for proper operation. If error repeats, replace Main PCA.
4	Parameter Copies - A failure has been detected in the non-volatile memory on the Main PCA.	Reset the parameter by simultaneously pressing the two user buttons while reconnecting the power cord. Reconfigure unit and test for proper operation. If error repeats, replace Main PCA.
5	Watchdog Test - The watchdog in the 68HC16 has failed.	Replace Main PCA (see Note[1]).
6	Watchdog Time-out - The system was reset due to a watchdog time-out.	Cycle power to the unit. If error repeats, replace the Main PCA (see Note[1]).

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

Error Code Chart (Continued)

Error Code	Problem	Corrective Action
7	Key Stuck - One of the keys is stuck in the closed position.	Verify that nothing is pressing a key. Replace control pad. If error persists, replace Main PCA (see Note[1]).
8	Motor Overspeed - The speed of the motor was determined to be above acceptable limits.	Replace blower assembly (see Note[1]). If error persists, replace Main PCA (see Note[1]).
9	Motor Underspeed - The speed of the motor was determined to be below acceptable limits.	Replace blower assembly (see Note[1]). If error persists, replace Main PCA (see Note[1]).
10	Over Pressure	Replace blower assembly (see Note[1]). If error persists, replace Main PCA (see Note[1]).
11	Motor Current 1 - The motor current has exceeded its limit.	Replace blower assembly (see Note[1]). If error persists, replace Main PCA (see Note[1]).
12	Motor Current 2 - The motor current has exceeded its limit.	Replace blower assembly (see Note[1]). If error persists, replace Main PCA (see Note[1]).
13	Motor Current 3 - The motor current has exceeded its limit.	Replace blower assembly (see Note[1]). If error persists, replace Main PCA (see Note[1]).
14	Rotor Locked - The motor could not be started.	Replace blower assembly (see Note[1]). If error persists, replace Main PCA (see Note[1]).
15	Program Sequence - External conditions prevented the proper operation of the software.	Replace Main PCA (see Note[1]).

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

Error Code Chart (Continued)

Error Code	Problem	Corrective Action
16	SW Error - An unexpected condition has been detected by the software.	If error persists, replace Main PCA (see Note[1]).
17	A / D Converter - The A / D converter in the 68HC16 is not functioning properly.	Replace Main PCA (see Note[1]).
18	Input V too Low - The input voltage is reading to low for the unit to operate properly.	Verify proper input voltage. Otherwise replace Main PCA (see Note[1]).
19	DC input voltage too low	Verify proper input voltage. Otherwise replace Main PCA (see Note[1]).
20	Address Error	If error persists, replace Main PCA (see Note[1]).
21	Invalid Flow Table Error	Replace Main PCA (see Note[1]).
22	Pressure Offset Error	Recalibrate unit. If error persists, replace Main PCA (see Note[1])
23	Flow Offset Error	Recalibrate unit. If error persists, replace Main PCA (see Note[1])
24	Pressure Line Loss Error	Verify pressure lines are connected, If error persists, replace Main PCA.

NOTE 1: Due to required testing on the BiPAP Pro Bi-Level System, this repair must be performed at a service center equipped with a Multi Functional Test Station. Contact Respironics Technical Service for details.

6.6 SmartCard Error Code Chart

Error Code	Problem	Corrective Action
1	Read Fail - Card orientation is wrong	Re-enter the SmartCard. If error still persists, replace SmartCard.
2	Invalid card type - orientation is wrong or wrong card.	Re-enter the SmartCard. If error still persists, replace SmartCard.
3	Invalid Card Format - Information on SmartCard is incorrectly entered.	Place the SmartCard in the Reader/ Writer and re-enter the information back onto the SmartCard.
4	Unit in Dealer Mode.	Remove power from the BiPAP Pro Bi-Level system. Reconnect power to unit without pressing any keys.
5	Unit in Calibration Mode.	Remove power from the BiPAP Pro Bi-Level system. Reconnect power to unit without pressing any keys.
6	Invalid Card ID Block. The checksum in the SmartCard ID block is invalid.	Remove and / or replace SmartCard.
100	Prescription Block Checksum Failure	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
101	Prescription Version Error.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
102	Invalid Unit. The unit is not capable of the specified prescription.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
103	Prescription Format Error. Software cannot understand the format of the prescription.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.

SmartCard Error Code Chart Continued

Error Code	Problem	Corrective Action
104	Prescription Invalid - The unit has no knowledge of the prescription entered.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
105	Prescription parameter out of range.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
200	Invalid Card Data Control Block.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
201	Invalid Card Data Control Block.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
202	Card Data Control Block Check Error.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
203	Control Blocks Invalid.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
300	Invalid UIDB Version	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.
301	UIDB Block Check Error.	Use the SmartCard Wizard in Encore 3.0 to format the SmartCard.

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Chapter 7: Repair & Replacement

7.1 Overview 7-3

7.2 BiPAP Pro Bi-Level System Repair Parts 7-5

7.3 Warnings and Cautions 7-9

7.4 Replacement Instructions 7-9

Notes

Chapter 7: Repair & Replacement

7.1 Overview

Figure 7-1 lists the names and identifies the locations of the replaceable components in the BiPAP Pro Bi-Level System. This provides a quick reference and overview of the unit. Within each replacement section, more detailed support information is provided to illustrate the exact component location and replacement procedure(s).

CAUTION: Due to required calibration after parts replacement, the following may not be field replaced on the BiPAP Pro Bi-Level System unless the unit is System Final Tested at a Respironics Service Center equipped with a Multi Functional Test Station.

- Main Printed Circuit Assembly
- Pressure Tubing
- Mass Flow Sensor Tubing
- Blower Assembly
- Valve Assembly
- Flow Element
- Flow Averaging Rings
- Enclosure Insert

For technical assistance or replacement part ordering information contact Respironics Worldwide Technical Service.

U.S. and Canada

Phone: **1-800- 345-6443**
Fax: **1-888-886-0245**

International

Phone: **001-724-387-4000**
Fax: **001-724-387-5012**

Visit Respironics Home Page on the World Wide Web at:

www.respironics.com

service@respironics.com

7.1.1 BiPAP Pro Bi-Level System Exploded View

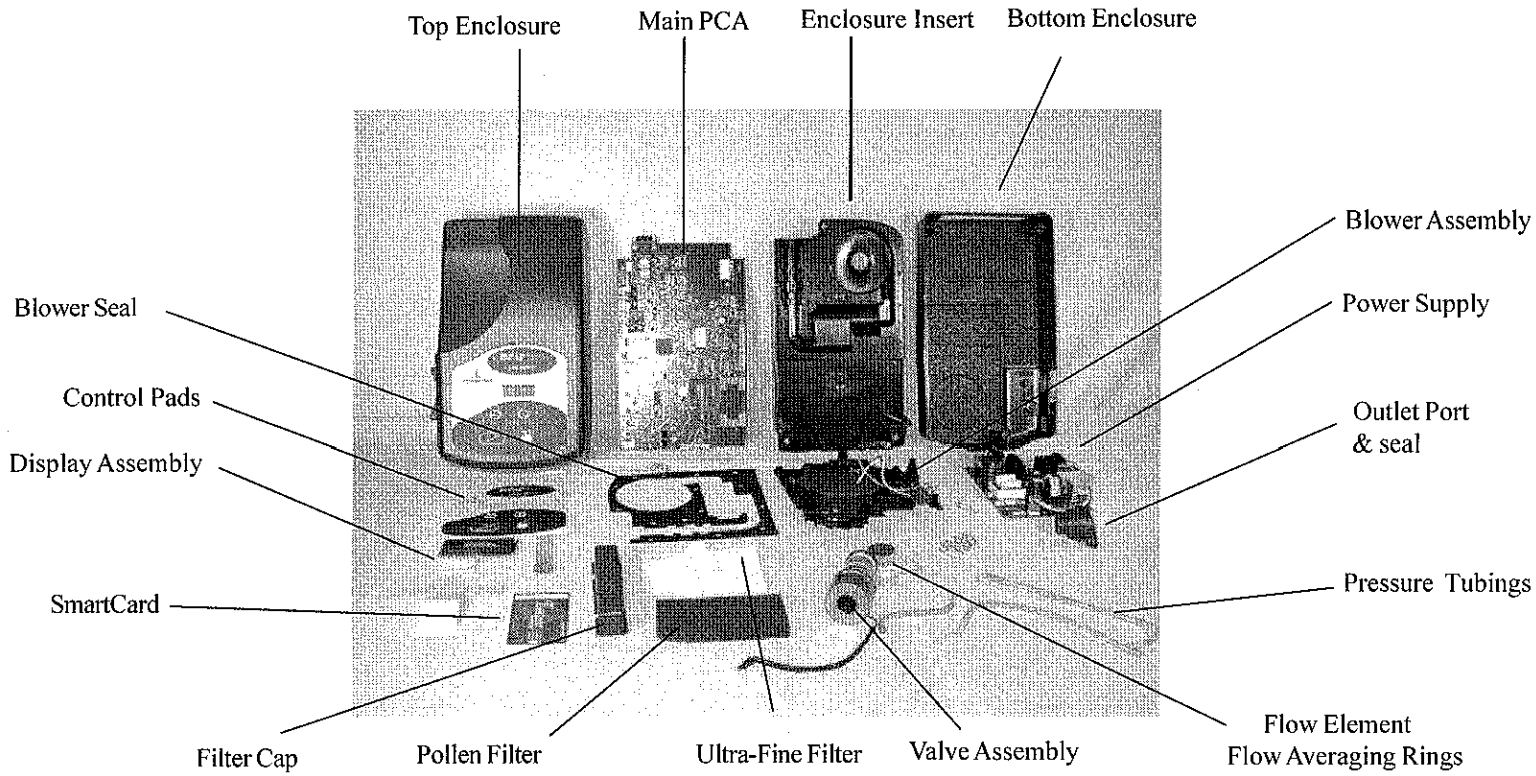


Figure 7-1
BiPAP Pro Bi-Level System Exploded View

7.2 BiPAP Pro Bi-Level System Repair Parts

Replacement Part	Replacement Part No.	Page No.
AC Power Cord (U. S. and Canada)	622243	N.A.
AC Power Cord (International)	See Note[2]	N.A.
Blower Assembly Includes • Blower assembly • Blower-to-enclosure insert seal • Flow Element • Flow Averaging Rings • 6-13 x 3/4″ screw (x15)	622187 See Note[1]	7-34
Bottom Enclosure Includes: • Bottom enclosure (w / label) • Bottom Strip • 8-18 Hi - Lo x 3/4″ screw (x5)	See Note[3]	7-12
Control Pad	1007823	7-21
Display Assembly Includes • Display PCA • LCD	622241	7-18

Replacement Part	Replacement Part No.	Page No.
DC Power Cord (Shielded)	1001956	N.A
BiPAP Pro Bi-Level System Service Manual (SmartCard)	1007803	N.A.
Enclosure Insert Includes: • Enclosure insert • Blower-to-enclosure insert seal	622184 See Note[1]	7-50
Filter, Disposable, Ultra-fine (x6)	622219	5-3
Filter, Reusable, Pollen (x2)	622220	5-3
Filter Cap	622183	5-4
BiPAP Pro Bi-Level System Main Printed Circuit Assembly Includes: • Main PCA • 6-19 x 3/8″ screw (x5)	1007822 See Note[1]	7-24
O_2 Enrichment Port (used for testing)	312010	N.A.

BiPAP Pro Bi-Level System Repair Kits (Continued)

Replacement Part	Replacement Part No.	Page No.
Outlet Port Includes: • Outlet Port • Outlet Port Seal	622239	7-31
Power Supply Printed Circuit Assembly Includes: • Power Supply PCA • 6-13 x 1 / 4″ screw (x4)	1002071	7-47
Pressure Tubing Kit Includes: • Pressure Tubing (5″) x 1 • Mass Flow Sensor Tubing (9″) x 2	622240	7-28
Test Orifice (used for Testing)	622244	N.A.
Top Enclosure Includes • Top Enclosure • 8 -18 Hi - Lo x 3/4″ screw (x3)	1004702	7-14
Valve Assembly Includes • Valve Assembly • Blower-to-enclosure insert seal • Flow Element • Flow Averaging Rings	622242	7-39

Comments:

- Exploded view is shown on page 7-4
- All items have a quantity of one unless otherwise specified.
- Part replacement procedures are detailed within this chapter.
- Assorted tubing, cables, and hardware are supplied with each Replacement Kit.

Note 1: Due to required testing after replacement, these items are only replaceable at a Respironics Service Center equipped with a Multi Function Test Station.

Note 2: Contact Respironics International Customer Service for further AC Power Cord information.

Note 3: Contact Respironics Worldwide Technical Service Department for bottom enclosure ordering information.

7.3 Warnings and Cautions

WARNING: To prevent electrical shock, disconnect the electrical supply before attempting to make any repairs to the BiPAP Pro Bi-Level System.

CAUTION: Electronic components used in this unit are subject to damage from static electricity. Repairs made to this unit must be performed only in an antistatic, Electro-Static Discharge (ESD)-protected environment.

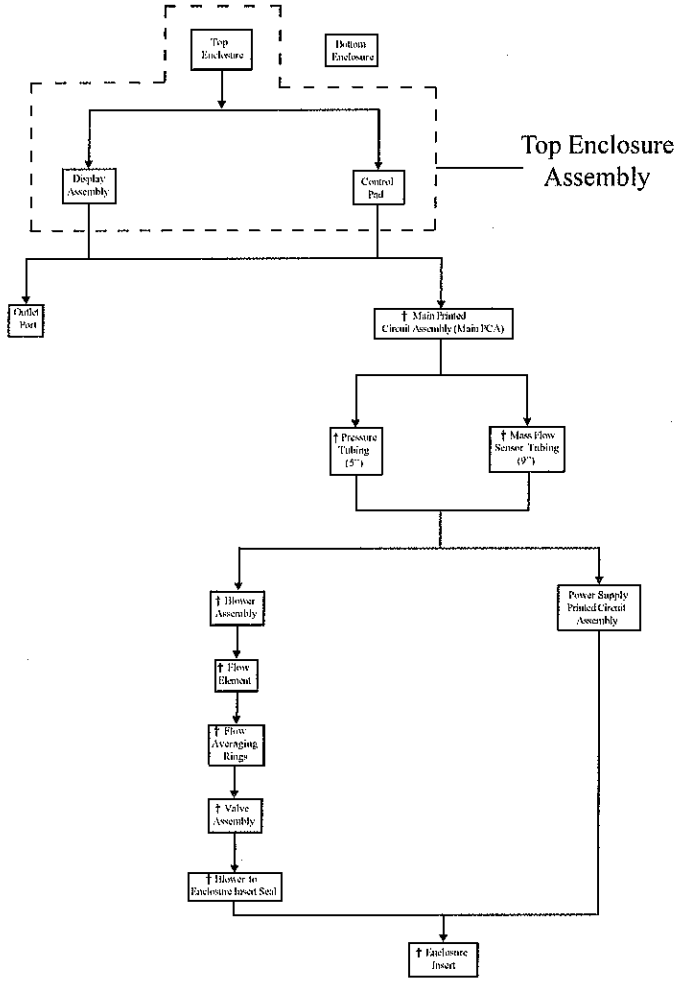
CAUTION: Due to required calibration after parts replacement, the following may not be field replaced on the BiPAP Pro Bi-Level System unless the unit is System Final Tested at a Respironics Service Center equipped with a Multi Function Test Station.

- Main Printed Circuit Assembly
- Pressure Tubing
- Mass Flow Sensor Tubing
- Blower Assembly
- Valve Assembly
- Flow Element
- Flow Averaging Rings
- Enclosure Insert

7.4 Replacement Instructions

See Figure 7-2 and 7-3 before removing or installing any components. These figures will detail the order in which each item must be removed or installed and should be used as a guideline for quick reference.

Replacement Instructions (Continued)



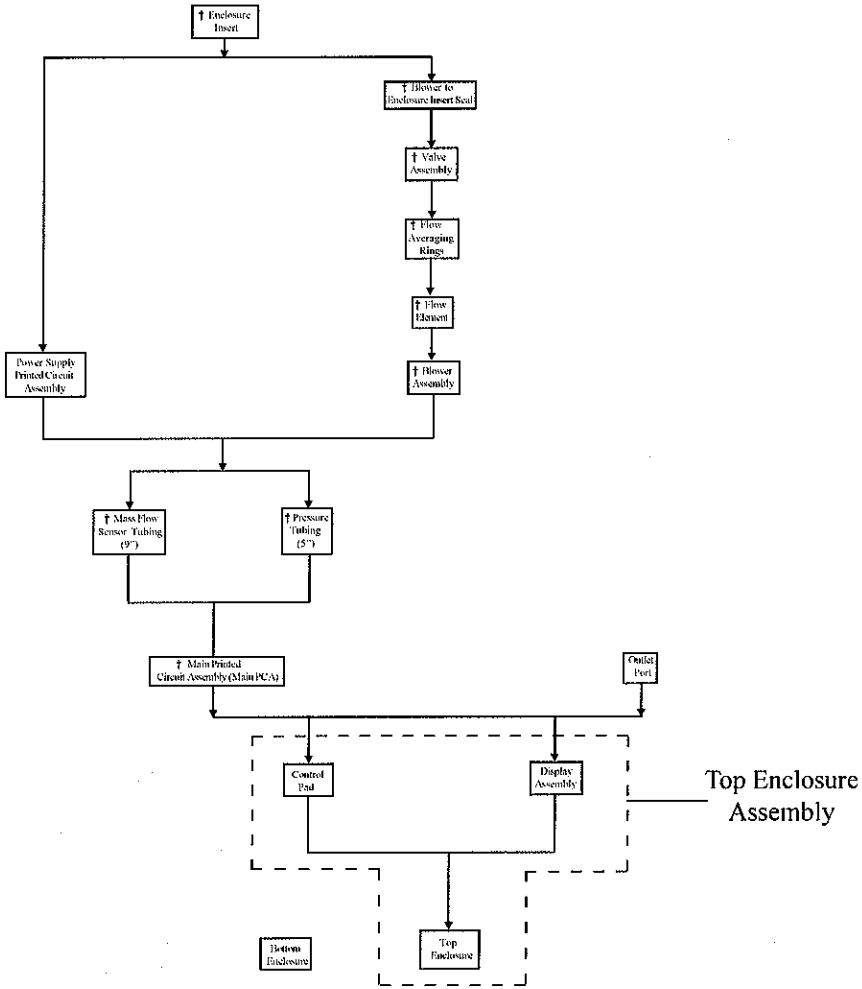
Removal Flow Chart

Figure 7-2
Removal Flow Chart

Chart Usage: Determine which item is to be replaced then follow the line of flow back to the "Top Enclosure" and begin the removal process. Detailed procedures begin on the referenced page numbers.

† Caution: Due to required calibration after parts replacement on the BiPAP Pro Bi-Level System, the following may only be replaced at a service center equipped with a Multi Functional Test Station. Contact Respironics Worldwide Technical Service Department for further information.

Replacement Instructions (Continued)



Installation Flow Chart

Figure 7-3
Installation Flow Chart

Chart Usage: Determine which item is to be installed then follow the line of flow down to the "Top Enclosure" and begin the installation process. Detailed procedures begin on the referenced page numbers.

† Caution: Due to required calibration after parts replacement on the BiPAP Pro Bi-Level System, the following may only be replaced at a service center equipped with a Multi Functional Test Station. Contact Respironics Worldwide Technical Service Department for further information.

7.4.3 Bottom Enclosure Replacement

Replacement Part Number (See Note[3] on page 7-8)

Included in Kit:	Tools Required:
Bottom Enclosure (w / label) 8-18 Hi - Lo x 3/4″ screws (x5)	Phillips screwdriver (No. 2 medium)

Procedure

Removed / Installed During Process:

- Bottom Enclosure

WARNING: Electrical shock hazard: Disconnect the electrical supply before attempting to make any repairs to the device.

CAUTION: Electronic components used in this device are subject to damage from static electricity. Repairs made to this device must be performed only in an antistatic, ESD-protected environment.

Bottom Enclosure

Figure 7-4
Bottom Enclosure

Bottom Enclosure Replacement (Continued)

Step 1 Removing the Bottom Enclosure

a. Place the unit upside down on a protected work surface.

b. Remove the two screws that attach the accessory cover to the bottom enclosure.

c. Using a Phillips screwdriver, remove the three screws that secure the bottom enclosure to the top enclosure.

d. Lift the bottom enclosure from the rest of the unit.

e. Carefully, turn the unit over and remove the screws.

Step 2 Installing the Bottom Enclosure

a. Ensure that the outlet port is still properly seated in the enclosure insert.

b. Align and place the bottom enclosure onto the enclosure insert.

c. Ensure that the bottom enclosure is properly seated in the top enclosure.

d. Install and secure the three mounting screws.

e. Align the accessory cover with the bottom enclosure.

f. Install and secure the two mounting screws.

g. Carefully return unit to the upright position.

Figure 7-5
Removing the Bottom Enclosure